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Bifenthrin Summary Document
Registration Review: Initial Docket
June 2010

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Case # 7402

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Date

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This Preliminary Work Plan and Fact Sheet summarize the Environmental Protection Agency's current position based on the following documents:

1. Environmental Fate and Ecological Risk Assessment Problem Formulation in Support of Registration Review for Bifenthrin, June 9, 2010.
2. Bifenthrin Human Health Assessment Scoping Document in Support of Registration Review, May 25, 2010.
3. Appendix A: Food/Feed & Non-Food/Non-Feed Uses Considered in Registration Review Work Planning – Bifenthrin (128825), May 6, 2009
4. Screening Level Estimates of Agricultural Uses of Bifenthrin (128825), October 19, 2009
5. Bifenthrin Review of Human Incident, February 25, 2009

All supporting documents for the registration review of bifenthrin are located in docket EPA-HQ-OPP-2010-0384 at www.regulations.gov.

I. PRELIMINARY WORK PLAN – Bifenthrin

Introduction:

The Food Quality Protection Act (FQPA) of 1996 mandated a registration review program. All pesticides distributed or sold in the United States (U.S.) generally must be registered by the Environmental Protection Agency (EPA or the Agency), based on scientific data showing that they will not cause unreasonable risks to human health or the environment when used as directed on product labeling. The registration review program is intended to make sure that, as the ability to assess risk evolves and as policies and practices change, all registered pesticides continue to meet the statutory standard of no unreasonable adverse effects to human health or the environment. Changes in science, public policy, and pesticide use practices will occur over time. Through the registration review program, the Agency periodically reevaluates pesticides to make sure that as change occurs, products in the marketplace can be used safely. Information on this program is provided at: http://www.epa.gov/oppsrrd1/registration_review/ .

The Agency is implementing the registration review program pursuant to Section 3(g) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and will review each registered pesticide every 15 years to determine whether it continues to meet the FIFRA standard for registration. The Agency will consider benefits information and data as required by FIFRA. The public phase of registration review begins when the initial docket is opened for each case. The docket is the Agency's opportunity to state what it knows about the pesticide and what additional risk analyses and data or information it believes are needed to make a registration review decision. After reviewing and responding to comments and data received in the docket during this initial comment period, the Agency will develop and commit to a final work plan and schedule for the registration review of bifenthrin.

Bifenthrin is a broad-spectrum Type I non-systemic pyrethroid insecticide/miticide registered for use in a variety of indoor and outdoor residential and commercial areas, including indoor pet uses and food handling establishments, as well as on a variety of agricultural and livestock commodities. Bifenthrin was first registered in 1989, and therefore, not subject to a Reregistration Eligibility Decision (RED). In 1999, EPA assessed tolerances of bifenthrin consistent with FQPA (64 *Fed. Reg.* 35051, June 30, 1999).

Anticipated Risk Assessment and Data Needs

The Agency anticipates requiring data to conduct a comprehensive ecological risk assessment, including an endangered species risk assessment, for all uses of bifenthrin. The Agency also anticipates requiring data to conduct dietary, residential, occupational, and aggregate human exposure risk assessments.

Ecological Risk:

- The most recent risk assessment that evaluated ecological exposure to bifenthrin use was performed in 2008 as part of a new use for bifenthrin on bushberries subgroup 13B and leaf petioles subgroup 4B.

- The Agency has not conducted an ecological risk assessment that supports an endangered species determination for bifenthrin. The ecological risk assessment planned during registration review will allow the Agency to examine whether bifenthrin's use has "no effect" or "may affect" federally listed threatened or endangered species (listed species) or their designated critical habitats. When an assessment concludes that a pesticide's use "may affect" a listed species or its designated critical habitat, the Agency will consult with the U.S. Fish and Wildlife Service (FWS) and/or National Marine Fisheries Service (NMFS) (the Services), as appropriate.

- The Agency anticipates needing the following data in order to conduct a complete ecological risk assessment, including an endangered species assessment for bifenthrin:

Bifenthrin

- GDLN 835.1230– Mobility Adsorption/Desorption (TGAI)
- GDLN 835.2120 – Hydrolysis (TGAI)
- GDLN 835.2240 – Photodegradation in Water (TGAI)
- GDLN 835.4100 – Aerobic Soil Metabolism (one additional soil) (TGAI)
- GDLN 835.4200 – Anaerobic Soil Metabolism (three additional soils) (TGAI)
- GDLN 835.4300 – Aerobic Aquatic Metabolism (TGAI)
- GDLN 835.4400 – Anaerobic Aquatic Metabolism (TGAI)
- GDLN 835.6100 (footnote 7) – Environmental Chemistry Methods – soil (TGAI)
- GDLN 835.6200 (footnote 7) – Environmental Chemistry Methods – water and sediment (TGAI)
- GDLN 850.1010 – Acute Toxicity Freshwater Invertebrates (*Hyalella azteca*) (TGAI)
- GDLN 850.1035 – Acute Toxicity Estuarine/Marine Organisms – Mysid (TEP)
- GDLN 850.1350 – Aquatic Invertebrate Life Cycle (saltwater) (TGAI)
- GDLN 850.1400 – Fish Early Life Stage (saltwater) (TGAI)
- GDLN 850.1735 – Whole Sediment Acute Invertebrates (Freshwater)
- GDLN 850.1740 – Whole Sediment Acute Invertebrates (Estuarine/Marine)
- GDLN 850.2100 –Avian Oral Toxicity (passerine species) (TGAI)
- GDLNs 850.4100 & 850.4150 – Seedling Emergence & Vegetative Vigor (Tier II) (TEP)
- GDLNs 850.4400 & 850.5400 – Aquatic Plant Growth (algal and aquatic vascular plant toxicity) (Tier II) (TGAI)
- Non-GDLN – Whole sediment: chronic invertebrates, freshwater and marine (TGAI)

- Non-GDLN – Leachability from Treated Wood (TGAI)
- Non-GDLN – Publically Owned Treatment Works (POTW) Treatability Study (TGAI)
  - The Agency is anticipating requiring a bench scale study of waste water treatment, to assess the percentage removed in the biosolids by the treatment, the amount that would degrade, and the amount that would remain in the waste water. These data would be used to inform removal percentages by waste water treatment, which is an input to the Exposure and Fate Assessment Screening Tool (E-FAST) down-the-drain model.

- Please refer to *Environmental Fate and Ecological Risk Assessment Problem Formulation in Support of Registration Review for Bifenthrin* (June 9, 2010), for a more detailed discussion of the anticipated ecological risk assessment and data needs.

Human Health Risk:

- The most recent risk assessment that evaluated dietary (food and water), aggregate residential, and occupational exposure to bifenthrin was a 2008 new use assessment for bifenthrin on bushberries subgroup 13B and leaf petioles subgroup 4B

- The Agency is investigating the need for additional experimentation, specific to the mode of action and pharmacokinetic characteristics of pyrethroids, to evaluate the potential for increased susceptibility of young organisms. A meeting of the FIFRA Scientific Advisory Panel (SAP) is planned for July 2010. For more information on the pyrethroid developmental neurotoxicity (DNT) requirement, see http://www.epa.gov/oppsrrd1/reevaluation/pyrethroids-pyrethrins.html.

- The toxicology database is incomplete with a data gap for immunotoxic effects (a new requirement for Part 158) and an outstanding 90-day inhalation study. The uncertainty factor is currently 100X (1X FQPA safety factor, and 10X for inter-species variation and 10X for intra-species variation). However, the FQPA safety factor will be re-evaluated for bifenthrin following a final determination of the potential for increased susceptibility of infants and children to pyrethroid pesticides based on the review of all available data.

- The tolerance expression in 40 CFR 180.442 will be reviewed during registration review to ensure that it appropriately covers the metabolites and degradates of bifenthrin and that it specifies the residues to be measured for each commodity. In addition, the Agency anticipates updating the grape and almond hull tolerances based on current and expected field trial data.

- EPA anticipates conducting a new dietary risk assessment using the new crop field trial data and other toxicity data anticipated to be required by the Agency, as well as evaluating the FQPA safety factor. The Agency does not, however, anticipate need to update the potential exposure from drinking water sources as part of this assessment.

- Further, a complete updated residential risk assessment may be required under registration review based upon revisions to the Agency's Residential Standard Operating Procedures, and if new data are identified which impact exposure estimates, new points of departure, a revised FQPA safety factor, or revisions to exposure policies and procedures are made. Furthermore, based upon the final determination for bifenthrin uncertainty factors, the residential assessment of bifenthrin would be reviewed to ensure that exposure/risk estimates are health protective. No additional data gaps were identified in the residential exposure assessment database during the registration review scoping process.

- An updated aggregate risk assessment may be required under registration review based upon the final determination of the bifenthrin safety factors and an updated dietary and residential risk assessment.

- The Agency does not anticipate conducting an updated occupational risk assessment for the non-granular formulations during registration review. However, an updated risk assessment may be required for any bifenthrin use site if new data are identified which impact exposure estimates, new points of departure, or revisions to exposure policies and procedures are made. Furthermore, based upon the final determination for bifenthrin safety factors, the occupational assessment of bifenthrin would be reviewed to ensure that exposure/risk estimates are health protective.

- The Agency does anticipate, however, conducting an updated residential and occupational risk assessment of the granular product at the registered rate of 0.4 pounds of active ingredient per acre (lb ai/A). The granular product is used in multiple residential and occupational settings, and previous occupational risk assessments considered a maximum application rate of 0.2 lb ai/A.

- Bifenthrin belongs to the pyrethroid class of insecticides. This class also includes permethrin, cypermethrin, cyfluthrin, deltamethrin, tau-fluvalinate, fenpropathrin, and lambda-cyhalothrin, among others. EPA developed a draft science policy document on the proposed common mechanism of toxicity for naturally-occurring pyrethrins and synthetic pyrethroids (Proposed common mechanism grouping for the pyrethrins and pyrethroids, draft, May 19, 2009 http://www.regulations.gov/search/Regs/home.html#documentDetail?R=09000064809a62df). This document was supported by the FIFRA SAP and is available in the docket. *See* http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a1f8d7. EPA will finalize the policy document on the pyrethroid common mechanism of toxicity taking into account the SAP comments. Pesticides with a common mechanism of toxicity are subject to cumulative risk assessment under the FQPA. Research is on-going by EPA's Office of Research and Development (ORD) to make improvements to the Stochastic Human Exposure and Dose Simulation (SHEDS) probabilistic exposure model, which are important for the cumulative risk assessment. EPA ORD is also developing physiologically-based

pharmacokinetic models for several pyrethroids. The status of both of these research modeling efforts will be reviewed by the FIFRA SAP in July, 2010. For information regarding EPA's efforts to evaluate the risk to pyrethroids. *See* http://www.epa.gov/oppsrrd1/reevaluation/pyrethroids-pyrethrins.html.

- The Agency anticipates requiring the following data in order to conduct a complete human health risk assessment for bifenthrin:
    - GDLN 870.3465 – 90-Day Inhalation Study
    - GDLN 870.7800 – Immunotoxicity Study
    - GDLN 860.1340 – Residue Analytical Method (revised version of method P-2763)
    - GDLN 860.1500 – Magnitude of Residue in Crop Plants [herb subgroup 19A, artichoke, caneberry subgroup 13-07A, hops, cotton gin byproducts, and grapes].

- Please refer to *Bifenthrin Human Health Assessment Scoping Document in Support of Registration Review* (May 25, 2010), available in the docket, for a detailed discussion of the anticipated human health risk assessment and data needs for bifenthrin.

Other Data Needs:

- GLDN 830.7050 UV/Visible Light Absorption – this study is a new data requirement under 40 CFR part 158 (Product Chemistry Data Requirements) for registration of a pesticide (food and non-food uses). The Agency anticipates requiring this study to obtain basic information about the compound's identity/composition and the wavelengths at which the compound may be susceptible to photochemical degradation.

Endocrine Disruptor Screening Program

As required under FFDCA section 408(p), EPA has developed the Endocrine Disruptor Screening Program (EDSP) to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans or wildlife similar to an effect produced by a "naturally occurring estrogen, or other such endocrine effects as the Administrator may designate." The EDSP employs a two-tiered approach to making the statutorily required determinations. Tier 1 consists of a battery of 11 screening assays to identify the potential of a chemical substance to interact with the estrogen, androgen, or thyroid (E, A, or T) hormonal systems. Chemicals that go through Tier 1 screening and are found to have the potential to interact with E, A, or T hormonal systems will proceed to the next stage of the EDSP where EPA will determine which, if any, of the Tier 2 tests are necessary based on the available data. Tier 2 testing is designed to identify any adverse endocrine related effects caused by the substance, and establish a quantitative relationship between the dose and the E, A, or T effect.

Between October 2009 and February 2010, EPA issued test orders/data call-ins for the first group of 67 chemicals, which contains 58 pesticide active ingredients and 9 inert ingredients. This list of chemicals was selected based on the potential for human exposure through pathways such as food and water, residential activity, and certain post-application agricultural scenarios. This list should not be construed as a list of known or likely endocrine disruptors.

Bifenthrin is among the group of 58 pesticide active ingredients receiving EDSP test orders. For information on the status of the orders issued under the EDSP for each chemical, please visit our website at http://www.epa.gov/endo/ and click on the "Status of EDSP Orders/DCIs" in the Highlights Box. Additional information on the EDSP, including the policies and procedures, the list of 67 chemicals, the test guidelines and the Tier 1 screening battery, can also be found at this website.

Timeline:

The Agency has created the following estimated timeline for the completion of the bifenthrin registration review.

Registration Review for Bifenthrin – Projected Registration Review Timeline	
Activities	**Estimated Date**
Opening the docket	
Open Docket and Public Comment Period	2010 – June
Close Public Comment	2010 – August
Case Development	
Final Work Plan	2010 – November
Issue DCI	2011 – July – Sept.
Data Submission	2013 – July – Sept.
Open Public Comment Period for Draft Risk Assessments	2015 – Jan. – March
Close Public Comment Period	2015 – April - June
Registration Review Decision	
Open Public Comment Period for Proposed Registration Review Decision	2015 – July - Sept.
Close Public Comment Period	2015 – Oct. – Dec.
Registration Review Decision and Begin Post-Decision Follow-up	2016
Total (years)[1]	6

1. An assessment of the potential cumulative risk from the pyrethroid class of insecticides may impact this time estimate.

Guidance for Commenters:

The public is invited to comment on EPA's preliminary registration review work plan and rationale. The Agency will carefully consider all comments, as well as any additional information or data provided in a timely manner, prior to issuing a final work plan for the bifenthrin case.

Trade Irritants:

Through the registration review process, the Agency intends to solicit information on trade irritants and, to the extent feasible, take steps toward facilitating irritant resolution. Growers and other stakeholders are asked to comment on any trade irritant issues resulting from lack of Maximum Residue Limits (MRLs) or disparities between U.S. tolerances and MRLs in key export markets, providing as much specificity as possible regarding the nature of the concern.

Environmental Justice:

EPA seeks to achieve environmental justice, the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies. To help address potential environmental justice issues, the Agency seeks information on any groups or segments of the population who, as a result of their location, cultural practices, or other factors, may have atypical, unusually high exposure to bifenthrin compared to the general population. Please comment if you are aware of any sub-populations that may have atypical, unusually high exposure, compared to the general population.

Water Quality:

Bifenthrin is not identified as a cause of impairment for any water bodies listed as impaired under section 303(d) of the Clean Water Act, based on information provided at http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.cause_detail_303d?p_cause_group_id=885. However, the pyrethroids as a group have been identified as a cause for impairment for three water bodies in Central Valley, CA: Del Puerto Creek, Ingram Creek Site (confluence with Hospital Creek to Hwy 33 crossing) and second Ingram Creek Site (confluence with San Joaquin River to confluence with Hospital Creek).

Nonetheless, no Total Maximum Daily Load (TMDL) criteria have been developed for bifenthrin, based on information provided at http://iaspub.epa.gov/tmdl_waters10/attains_nation.tmdl_pollutant_detail?p_pollutant_group_id=885&p_pollutant_group_name=PESTICIDES. More information on impaired water bodies and TMDLs can be found at http://www.epa.gov/owow/tmdl/. The Agency invites submission of water quality data for this pesticide. To the extent possible, data should conform to the quality standards in Appendix A of the *OPP Standard Operating Procedure: Inclusion of Impaired Water Body and Other Water Quality Data in OPP's Registration Review Risk Assessment and Management Process* (see: http://www.epa.gov/oppsrrd1/registration_review/water_quality_sop.htm) in order to ensure they can be used quantitatively or qualitatively in pesticide risk assessments.

Additional Information:

Stakeholders are also specifically asked to provide information and data that will assist the Agency in refining risk assessments, including any species-specific ecological effects determinations. The Agency is interested in receiving the following information:

1. Confirmation on the following label information.
    a. sites of application
    b. formulations
    c. application methods and equipment
    d. maximum application rates
    e. frequency of application, application intervals, and maximum number of applications per season and per year
    f. geographic limitations on use
2. Use or potential use distribution (*e.g.* geographical distribution of relevant uses).
3. Use history.
4. Median and 90th percentile reported use rates (lb/A, lb 1K sq.ft) from usage data – national, state and county.
5. Application timing (date of first application and application intervals) by use – national, state, and county.
6. Usage/use information for non-agricultural uses.
7. Directly acquired county-level usage data (not derived from state level data).
    a. maximum reported use rate (lb/cc) from usage data – county
    b. median and 90th percentile number of applications – county
    c. total pounds per year – county
    d. the year the pesticide was last used in the county/sub-county area
    e. the years in which the pesticide was applied in the county/sub-county area
8. Typical application interval (days).
9. State or local use restrictions.
10. Ecological incidents specific to bifenthrin (non-target plant damage and avian, fish, reptilian, amphibian, mammalian mortalities, and bee or beneficial insect mortalities) not already reported to the Agency.
11. Monitoring data, including existing or ongoing Publically Owned Treatment Works (POTWs) effluent monitoring data for the pyrethroids be submitted to the Agency.
12. Any adverse effects in honey bees or other beneficial insects associated with the use of bifenthrin products.

Next Steps:

After the 60-day comment period closes, the Agency will consider and respond to any comments received in a timely manner and then expects to issue a Final Work Plan in November of 2010 for bifenthrin.

II. FACT SHEET

Background Information:

- Bifenthrin registration review case number: 7402
- Bifenthrin PC Code: 114402; CAS # 82657-04-3
- Bifenthrin was first registered in the United States in 1989.
- Technical registrants: Amvac Chemical Corporation, Arysta Lifescience North America, AXSS, USA, LLC., FMC Corporation, Makhteshim Chemical Works LTD, and United Phosphorus, Inc.
- There are approximately 344 FIFRA Section 3 product registrations, including six technical registrations.
- Pesticide Re-evaluation Division Contact: Jacqueline Guerry (guerry.jacqueline@epa.gov).
- Registration Division Contact: Richard Gebken (gebken.richard@epa.gov).

Use and Usage Information: (For additional details, please refer to *Food/Feed & Non-Food/Non-Feed Uses Considered in Registration Review Work Planning – Partial Listing, Bifenthrin (128825)* (May 6, 2009) in the bifenthrin docket.

- Bifenthrin is a Type I pyrethroid insecticide registered for a variety of agricultural, non-agricultural and residential uses, including corn, cotton, soybeans, green beans, caneberries, blueberries, strawberries, raspberries, canola, pumpkins, peas, beans, broccoli, canola, lettuce, artichokes, hops, pears, eggplants, citrus fruits, spinach, grapes, potatoes, cilantro, okra, tomatoes, almonds, carrots, peanuts, Swiss chard, Christmas tree plantations, conifers (seed orchards), golf course turf, rights-of-way, ornamentals, residential lawns, wood protection treatment, and food handling establishments.
- Bifenthrin is registered for use to control a variety of insects including aphids, worms, ants, gnats, moths, beetles, grasshoppers, mites, midges, spiders, ticks, yellow jackets, maggots, thrips, caterpillars, flies, fleas, and other pests in domestic, public health, agricultural, and industrial situations.
- Bifenthrin is formulated as ready-to-use-sprays (RTU), emulsified concentrate (EC), wettable powders (WP), granular (G), flowable concentrate (FIC), and pelletized tablets. Bifenthrin can be applied by a wide range of application methods, including aerial, ground boom, air blast, belly grinder, push-type spreader, low/high pressure handwand, paint roller, and foggers.
- The primary agricultural use of bifenthrin is on corn, including sweet corn (over 60% of pounds applied annually for agricultural use). Further, bifenthrin is widely used on hops and raspberries [approximately 70 percent crop treated (PCT) each], green beans and caneberries (approximately 30 PCT each), and cantaloupes and sweet corn (approximately 25 PCT each).

Recent and Pending Actions:

- The first bifenthrin dust product (EPA Reg. No. 1021-1858) for indoor and outdoor residential use was registered with the Agency in January of 2008. The Agency registered a second dust product (EPA Reg. No. 70506-209) in August of 2008.

- The Agency established tolerances for bushberry subgroup 13-07B and leafy petioles subgroup 4B on June 11, 2008.

- There is a pending decision (petition # 404594) for an indoor total release fogger use. The PRIA due date, originally May 2010, has been extended to July 2010.

- There is also a pending action (petition # 423991) for use on forage hay and grass. The PRIA due date is March 2011.

Ecological Risk Assessment Status

The following are key findings of the most recent ecological risk assessments conducted for bifenthrin registered uses. Please refer to *Environmental Fate and Ecological Risk Assessment Problem Formulation in Support of Registration Review for Bifenthrin* (June 9, 2010) located in the docket, for a detailed discussion of what is currently known about the environmental fate and ecological effects associated with bifenthrin.

- Based on the environmental fate properties, bifenthrin appears to be immobile, very persistent in both the laboratory and field studies, stable to hydrolysis and photolysis, very lipophilic, and bioaccumulative. Bifenthrin also adsorbs strongly to soil particles and to organic matter, and accumulates in sediment.

- Previous risk assessments conducted on bifenthrin, the most recent in 2008, indicate risk concerns for freshwater and estuarine/marine organisms. Bifenthrin is highly toxic on an acute and chronic basis to freshwater fish and aquatic-phase amphibians, and very highly toxic to freshwater aquatic invertebrates. Bifenthrin has also been classified as very highly toxic to estuarine/marine fish and invertebrates on an acute basis.

- The Agency concluded in previous assessments that the risk to birds and mammals was minimal due to low toxicity. Based on available data, bifenthrin has been classified as slightly toxic on an acute basis to birds, terrestrial-phase amphibians and reptiles. Bifenthrin showed no adverse effects to reproduction at the highest concentration tested for birds. Mammalian toxicity data suggest that this compound is moderately toxic to small mammals on an acute basis.

- Bifenthrin is highly toxic to terrestrial invertebrates, including beneficial insects such as honeybees.

- No data are available to evaluate toxicity of bifenthrin to terrestrial and aquatic plants.

Human Health Risk Assessment Status

The following are key findings of the human health risk assessments conducted for bifenthrin registered uses. Please refer to the *Bifenthrin Human Health Assessment Scoping Document in Support of Registration Review* (May 25, 2010) located in the docket for a detailed discussion of the human health risk assessment status.

- Past bifenthrin risk assessments rely in part on data from studies in which adult human subjects were intentionally exposed to a pesticide to determine their dermal and inhalation exposure. Many such studies, involving exposure to many different pesticides, comprise generic pesticide exposure databases such as the Pesticide Handlers Exposure Database (PHED), the Agricultural Reentry Task Force (ARTF) Database, and the Outdoor Residential Exposure Task Force (ORETF) Database. EPA has reviewed all the studies supporting these multi-pesticide generic exposure databases, and has found no clear and convincing evidence that the conduct of any of them was either fundamentally unethical or significantly deficient relative to the ethical standards prevailing at the time the research was conducted. All applicable requirements of EPA's Rule for the Protection of Human Subjects of Research (40 CFR Part 26) have been satisfied, and there is no regulatory barrier to continued reliance on these studies.

Hazard Characterization:

- Bifenthrin is a Type I pyrethroid (i.e., it lacks a cyano group at the α carbon position of the alcohol moiety) neurotoxic pesticide. All pyrethroids act as axonic poisons, affecting both the peripheral and central nervous systems, and share similar modes of action. Pyrethroids, including bifenthrin, stimulate repetitive action in the nervous system by binding to voltage-gated sodium channels, prolonging the sodium ion permeability during the excitatory phase of the action potential.

- Bifenthrin has a moderate order of acute toxicity via the oral route (Category II) and a low order of acute toxicity via the dermal route (Category III) of exposure. There are no acute inhalation studies on bifenthrin technical; however, acceptable studies on the end-use products are available. Bifenthrin has a low vapor pressure. Bifenthrin is neither an eye nor skin irritant, nor is it a dermal sensitizer.

- There was no conclusive evidence of carcinogenic potential of bifenthrin in the rat. A mouse oncogenicity study provided some evidence for carcinogenic potential in this species; therefore, the Agency has characterized bifenthrin as a "possible human carcinogen" and used the reference dose (RfD) approach for risk assessment purposes.

- The Agency received an acceptable DNT for bifenthrin in 2006, and reduced the FQPA safety factor from 3x to 1X. In the DNT, maternal and offspring toxicity was observed at the same dose levels. The maternal toxicity was primarily manifested as tremors, clonic convulsions, and increased grooming counts. The offspring toxicity was manifested as increased grooming counts. This study does not show any evidence of increased susceptibility of offspring following exposure to bifenthrin. However, based on the Agency's review of existing pyrethroid data, EPA has come to the conclusion that the DNT is not a particularly sensitive study for comparing the sensitivity of young and adult animals to pyrethroids. The Agency is investigating the need for additional experimentation, specific to the mode of action and pharmacokinetic characteristics of pyrethroids, to evaluate the potential for increased susceptibility of young organisms.

Dietary Risk:

- A screening level dietary (food and drinking water) risk assessment was performed for a new use of bifenthrin on bushberries subgroup 13B and leaf petioles subgroup 4B in 2008. The acute and chronic dietary risk assessments indicated that for all registered and pending uses the risk estimates were below EPA's level of concern [<100% acute population adjusted dose (aPAD) and < 100% chronic population adjusted dose (cPAD)] for the general population and all population subgroups.

- In 40 CFR § 180.442, the tolerance for grapes is currently 0.20 ppm; however, residue levels between 0.05 ppm and 0.56 ppm were observed in field trials conducted in California. Therefore, in its 2002 review, the Agency recommended updating the tolerance for grapes to 0.60 ppm. In addition, in previous reviews (2002 and 2009), the Agency recommended updating the tolerance for almond nutmeat, and almond hulls. See the *Bifenthrin Human Health Assessment Scoping Document in Support of Registration Review* (May 25, 2010) for more detail.

Residential and Recreational Risk:

- An assessment of exposure/risk from the majority of current residential uses was performed in 2002, and identified no short- or intermediate-term residential handler or post-application risks of concern. Granular products with rates higher than 0.2 lb ai/A were registered with the Agency after 2002.

- In 2007, the Agency conducted a residential handler and post-application exposure assessment of a new use for an indoor bifenthrin dust product, which identified no risks of concern.

Aggregate Risk:

- The most recent assessment of bifenthrin aggregate risk was conducted in 2008 as part of the new use on bushberries subgroup 13B and leaf petioles subgroup 4B. Acute and chronic aggregate risks were assessed for food and drinking water only, as residential exposures were not expected for these duration scenarios. No risks of concern were identified by the Agency for the acute/chronic aggregate assessments.

- For short and intermediate aggregate exposures, the Agency assessed contributions from both dietary (food and water) and residential exposures. No risks of concern were identified by the Agency for these short- and intermediate-term aggregate exposure assessments.

Occupational Risk:

- Previous occupational exposure assessments for pesticide handlers and workers conducting activities in previously treated areas (post-application exposures) were based on worst-case estimates per crop grouping rather than per each individual use site. The previously assessed handler and post-application exposure scenarios for bifenthrin uses were not of concern to the Agency. The restricted re-entry interval for bifenthrin is 12 hours following application.

Cumulative assessment:

Bifenthrin is a member of the pyrethroid class of insecticides. This class also includes permethrin, cypermethrin, cyfluthrin, fluvalinate, bifenthrin, fenpropathrin, and lambda-cyhalothrin, among others. EPA developed a draft science policy document on the proposed common mechanism of toxicity for naturally-occurring pyrethrins and synthetic pyrethroids (Proposed common mechanism grouping for the pyrethrins and pyrethroids, draft, May 19, 2009; http://www.regulations.gov/search/Regs/home.html#documentDetail?R=09000064809a62df). This document was supported by the FIFRA Scientific Advisory Panel (SAP) and EPA will finalize the policy document on the pyrethroid common mechanism of toxicity taking into account the SAP comments. Pesticides with a common mechanism of toxicity are subject to cumulative risk assessment under the FQPA. Research is on-going by EPA's Office of Research and Development (ORD) to make improvements to the SHEDS probabilistic exposure model, which is important for the cumulative risk assessment. EPA ORD is also developing physiologically-based pharmacokinetic models for several pyrethroids. The status of both of these research modeling efforts will be reviewed by the FIFRA SAP in July, 2010. For information regarding EPA's efforts to evaluate the risk to pyrethroids, see http://www.epa.gov/pesticides/cumulative/ .

Incidents

Ecological:

- The Agency consulted the Avian Incident Monitoring System (AIMS), the Ecological Incident Information System (EIIS, version 2.1), and the Aggregate Incident Reports (AIR) database for reports of ecological incidents.

- Ten incidents from these databases have been classified as highly probable, probable, or possibly attributable to bifenthrin use. These incidents show that aquatic organisms and possibly bees may be adversely affected if exposed.

    - There were two fish incidents for bifenthrin reported as highly probable; three fish, one tree, and one leafcutter bee incident reported as probable; and two tree and one bee incident reported as possible for bifenthrin.

    - Two bifenthrin incidents were attributed to misuse, 4 were of unknown cause, and the remaining incidents were associated with a registered use of bifenthrin.

Human Health:

- EPA consulted the following two incident databases to prepare incident reports for bifenthrin in preparation of the registration review docket opening: OPP Incident Data System (IDS) and the Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (CDC/NIOSH) Sentinel Event Notification System for Occupational Risk (SENSOR).

- The Agency identified 1295 case reports in IDS allegedly attributable to bifenthrin reported to the IDS from 2002 until 2009. In the NIOSH SENSOR database, from 1998 to 2005, there are 108 cases reported for bifenthrin.

- Most of these incidents were of low severity. However, it appears that even low amounts of bifenthrin can cause adverse health effects, such as dermal and respiratory tract irritation and neurological symptoms (e.g., dizziness and altered sensations). Based on the number of incidents reported and effects noted in both databases, the evaluation of incident data warrants further analysis in the draft risk assessment phase of registration review. More details regarding human incidents are provided in *Bifenthrin: Review of Human Incidents*, dated February 23, 2010 and found in the registration review docket.

Tolerances and International Harmonization

Where possible, EPA strives to harmonize the US Tolerances and Maximum Residue Limits (MRLs) in key export markets. A table with US tolerances, Canada MRLs, Mexico MRLs and Codex MRLs for bifenthrin in registered raw agricultural commodities is provided in Attachment 2 of the *Bifenthrin Human Health Assessment Scoping Document in Support of Registration Review* (May 25, 2010). These tolerances and MRLs are based on the residue analysis of bifenthrin.

The current US tolerances are identical to the Codex MRLs for cattle meat, field corn grain, dried hop cones, pear, poultry fat, poultry meat byproducts, and poultry meat; therefore, these commodity MRLs are already harmonized. The US tolerances are higher than the Codex MRLs for cattle fat, cattle kidney, cattle liver, field corn stover, egg, milk fat, strawberry and potato.

Currently, Canada does not have MRLs established for the use of bifenthrin. Mexico has established identical MRLs to the US tolerances for eight raw agricultural commodities (RACs). However, for pea and bean, the MRLs established by Mexico are higher than US tolerances while lower for tomato and potato. However, Mexico generally defaults to US or Codex tolerances/MRLs for its export purposes. The Agency will work to harmonize tolerances/MRLs, where possible, during registration review.

Data Call-In Status

- There have been no data call-ins associated with bifenthrin.

Labels

- Active Section 3 labels for bifenthrin can be obtained from the Pesticide Product Label System (PPLS) website: http://oaspub.epa.gov/pestlabl/ppls.home .

III. Summary of Data Gaps – Bifenthrin

The table below summarizes all outstanding data needs for bifenthrin in Section I, of this document (Preliminary Work Plan), the *Environmental Fate and Ecological Risk Assessment Problem Formulation in Support of Registration Review for Bifenthrin* (June 9, 2010), and the *Bifenthrin Human Health Assessment Scoping Document in Support of Registration Review* (May 25, 2010). Some of the data in the table below was required as a condition of registration. All data, however, is anticipated to be included in the data call-in for registration review.

Guideline Number	Data Requirement	Test Material	Estimated Timeframe
830.7050	UV/Visible Light Absorption	TGAI	8
835.1230	Mobility Adsorption/Desorption	TGAI	12
835.2120	Hydrolysis[1]	TGAI	12
835.2240	Photodegradation in Water[2]	TGAI	12
835.4100	Aerobic Soil Metabolism[3]	TGAI	24
835.4200	Anaerobic Soil Metabolism[4]	TGAI	24
835.4300	Aerobic Aquatic Metabolism	TGAI	24
835.4400	Anaerobic Aquatic Metabolism	TGAI	24
835.6100 (footnote 7[5])	Environmental Chemistry Methods – soil	TGAI	24
835.6200 (footnote 7)	Environmental Chemistry Methods – water and sediment	TGAI	24
850.1010	Acute Toxicity Freshwater Invertebrates (Hyalella azteca)[6]	TGAI	12
850.1035	Acute Toxicity Estuarine/Marine Organisms – Mysid	TEP	12
850.1350	Aquatic Invertebrate Life Cycle (saltwater)	TGAI	12
850.1400	Fish Early Life Stage (saltwater)	TGAI	12
850.1735	Whole Sediment Acute Invertebrates (Freshwater)	TGAI	In Agency review

[1] The available study was performed in the presence of high levels of cosolvent acetonitrile and at high concentrations. The registrant must address the Agency's concern by demonstrating that the solvent has no effect on the hydrolysis of the test substances, or a new study is expected to be required.

2 The Agency may waive the requirement of a cosolvent concentration of ≤1% by volume provided that the registrant submits the following:

- The UV/Vis spectrum for bifenthrin in buffered solution (preferred at pH 5): this will allow the Agency to determine bifenthrin's potential for aqueous photolysis.
- Information confirming that efforts have been made to improve the analytical methods for the parent and possible transformation products.
- Evidence that acetonitrile (or the cosolvent chosen) does not sensitize bifenthrin, causing the rate of photolysis to increase.
- Proof that the lowest feasible concentration of the cosolvent was used.

3 One additional soil study is expected to be required.

[4] Three additional soil studies are expected to be required.

5 40 CFR Part 158 Guideline Study 835.6100 and 835.6200 Footnote 7 states "Environmental chemistry methods used to generate data associated with this study must include results of a successful confirmatory method trial by an independent laboratory. Test standards and procedures for independent laboratory validation are available as addenda to the guideline for this test requirement."

[6] Water column exposure, not sediment-spiked.

Guideline Number	Data Requirement	Test Material	Estimated Timeframe
850.1740	Whole Sediment Acute Invertebrates (Estuarine/Marine)	TGAI	In Agency review
850.2100	Avian Oral Toxicity (passerine species)	TGAI	12
850.4100 & 850.4150	Seedling Emergence & Vegetative Vigor (Tier II[7])	TEP	12
850.4400 & 850.5400	Aquatic Plant Growth (algal and aquatic vascular plant toxicity) (Tier II[8])	TGAI	12
Non-GDLN	Whole sediment: chronic invertebrates, freshwater and marine[9]	TGAI	12
Non-GDLN	POTW Treatability Study[10]	TGAI	12
Non-GDLN	Leachability from Treated Wood	TEP	In Agency review
860.1340	Residue Analytical Method (revised version of method P-2763)	TGAI	24
860.1500	Magnitude of Residue in Crop Plants [herb subgroup 19A, artichoke, caneberry subgroup 13-07A, hops, cotton gin byproducts, and grapes].	TGAI	24
870.3465	90-Day Inhalation Study[11]	TGAI	24
870.7800	Immunotoxicity Study	TGAI	12

[7] Registrants may opt to conduct a Tier I study, with the understanding that any adverse effects (even if <25%) may necessitate a Tier II study. A Tier II study will enable the Agency to conduct an endangered species assessment for nontarget plants.

[8] Registrants may opt to conduct a Tier I study, with the understanding that any adverse effects (even if <25%) may necessitate a Tier II study. A Tier II study will enable the Agency to conduct an endangered species assessment for nontarget plants.

[9] Tests on *Hyalella azteca, Chironomus tentans*, and *Leptocheirus plumulosus* are expected to be needed.

[10] The Agency anticipates requiring a protocol be submitted prior to conducting the study.

[11] An acceptable 28-day study duration should satisfy the Agency's short- and intermediate-term inhalation exposure data needs for this chemical based on current use patterns.